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Just as the human body evolves, the future society needs to adapt to the problems related to the growing population. New inventions such as Personal Air Vehicles (PAVs) will help solve the many problems that arise from the growing population in cities that most need such change. These metropolitan cities are facing transportation related problems such as: traffic jam, pollution, and noise. Meanwhile the new Era in transportation draws closer and thus all of these problems can be solved by introducing the new futuristic PAVs into our society. In overall, the purpose of such transportation transformation is to develop an easier way for a stronger economy, a healthier environment, and lower traffic delays, thus lowering stress induced with traffic.

The growing population is closely tied to the problems associated with transportation. Such problems are not just a hazard to people's safety and health but also to the economy of the peoples' country. A typical metropolitan city experiencing problems associated with the growing population is New York City. Overall NYC serves 14.6 million people a day, most of whom do not live in the New York City and thus have to travel to their work. On average 300 million vehicles pass through New York City per year (1). In other 85 metropolitan US cities people are spending 3.5 billion hours a year in traffic jams, whereas 20 years ago the amound of time spent in traffic jams was 700 million hours a year. Traffic delays cost NY city 600,000 work hours daily, thus 5 billion dollars are lost yearly in productivity (2). Problems associated with pollution are also common in metropolitan cities such as New York City. An environmental problem, cars' exhaustion emit carbon monoxide and other toxic gases that are a potential hazard to the overall heath of the New York City citizens (3). Economical stability and financial euphoria of the city is closely related to the health of the citizens that serve this economy. Moreover health is related to issues, other then pollution, related with noise. New York City Social Code prohibits noise louder then 45 decibels for the air conditioners(2). Meanwhile the noise level for average traffic in New York City is 85 decibels. (4) Thus it is impropable to introduce PAVs with the current proposed noise level of motorcycle or 100 decibels to the city that already never sleeps. Furthermore it is important to realise that introduction of PAVs into our lifes, does not mean car usage will exponentially decrease, rather PAVs will be an extra way for transportation.

In a recently proposed transportation plan Utah four strategica goals as the basis for improvements in the next 30 years are: taking care of what transportation exists, make transportation work better, improve safety, and increase capacity. Utah Transity Authority (UTA) proposes to invest money into a new state highway system (5). Thus the way this Authority is trying to solve

transportation problems associated with traffic jam is by expanding its highway. However such practice is lengthy and unproductive since a higher number of of highways creates allows higher car flow, whereas the main problems have not been solved. Since technology of cars does not change influentially the same and even greater number of pollution is created from these cars. Noise level increases as a result of a higher car flow and at the end the new highway project, becomes an even more dangerous trail. Other Transportation problems that are to arise will be in a sector of energy. Transportation currently uses 20% of global primary energy and is expected to grow between 150% to 280%. Thus currently 80 EJ/year is used per year whereas in the next 50 years the energy use will grow between 120 to 225 EJ/year. However it is estimated that with the new technologies and innovations such as PAVs the energy use can stay as low as 40 EJ/year for 2020 and 105 EJ/year for 2050. It is expected that both air traffic and road traffic will increase greater then 50% in 2020 and close to 200% in 2050. Thus if today almost 5 billion dollars are lost yearly because of the traffic problems, in 2020 almost 7.5 billion dollars will be lost, and in year 2050 an average of 10 billion dollars will be lost in year 2050 (6). If the society is to face such economical distress as a result of transportation traffic, the overall result will be devastating to the overall world economy. The use of petrolium in transportation is major cause of unrest in our political and social world. Thus new sources of energy need to be introduced in order to sustain such unrest, possible promising source of energy is hydrogen. Some of the promising innovations are the new DaimlerChrysler 200kW hydrogen buses introduced in ten European cities. Such buses are environmentally friendly, are able to carry 70 passengers, can drive 200 km until the next hydrogen cell refuel, and drive at 80km/h (2). As ideal as the new PAVs might be, the need to change energy source is great, thus possible scenario is an introduction of hydrogen fuel cells into these new PAVs.

Petrolium consumption travel needs in United States are 20 million barrels or 839,961,409 gallons a year. (7). The average car oil consumption for year 2001 is 24.5 miles/gallon. (8) With the current prices of an average of 2 dollars/gallon, 40$ are needed to completely fill the tank of a car. Meanwhile other newly developed car engines offer a much higher economy, that were Toyota Prius becomes the most efficient car in United States with 56 mpg.(9) Approximately 16 million new cars were sold in United States in 2004. Meanwhile the total number of cars in use in the United States is 204 million as recorded in 1997. It is prospected that car usage number will double by the year 1930.(10) U.S. households have approximately 1.9 cars per family. (11) Such high number of cars in USA is accounted by the growing population transportation needs of 295,884,788 people. Considering the fact that the world population today is 6.5 billion people and is projected to be 8.2 billion people in the year 2030, the need for million new manufactured cars will be great. (12) In order to sustain the

needs of such population other sources of energy and transportation will be needed to be invented and discovered. Such new vehicles with low or zero emissions are: ZEVs, PZEVs, SULEVs, TLEVs, Gas-Electric Hybrids, Fuel Cell, Hydrogen powered, CNG, and Biodiesel (13) Average American travels 20 miles/day and uses (14) The average American accounts for 3 gallons of petroleum/day. (15) In environmental issue cars are the main producers of carbon dioxide in the world. Thus an average American car produces 300 pounds of carbon dioxide from a full tank. Moreover other emitted gases from the car include methane and carbon monoxide, a highly toxic gas. In average cars account for 25% of all greenhouse gas emissions.(16) Despite the environmental and health hazards that the car poses, there is danger of noise level for humans. An average car produces 65 decibels of noise while traveling at 35 mph. While an average motorcycle produces 84 decibels.(17) In a city such as New York the maximum allowable noise level from appliances is 45 decibels. (18) Thus noise cancellation plays an important role in offices and homes located in New York. However there is hope in reduction of noise in the produces of such noise. New innovations such as Induction Noise Silencing Box can exponentially lower the noise to 1/8 of original. Thus a motorcycle that produces 84 decibels, would produce roughly 11 decibels. (19)

Air vehicles today include: airplanes, helicopters, and gliders. Airplanes are primarily used for pleasure, business, and community. Thus in New York in year 1995 the number of trips taken by airplanes used for commercial purposes was 8,004 and 254 trips made were not commercial. Moreover the number of trips that were taken outside of state were 7,450, whereas around 553 trips were taken inside New York State. Travel in United States by airplanes constituted 19.7% out of all possible ways of transportation. Around .7% of trips made in one year in 1995 were by personal aircraft. (20) Some of the widely used business and personal use aircraft are: Cessna 172 CPT, Cessna 172 M, Frasca 141, Frasca 142, Jeppesen FS200AC PCATD, Diamond Twin Star, Piper Warrior, Mooney 201. (21) The most efficient of these planes is the Diamond Twin Star with 16.9 nautical miles per gallon. For oil capacity, a single engine aircraft such as Cessna Skyhawk is able to hold on average 56 gallons of oil.(23) Also, an aircraft such as Cessna 182 is able to achieve a speed of 120 kt. (22) The speed and accessibility are the main purposes why airplanes are used by businesses to travel easily from locations such as L.A. to New York in under 4 hours. The price for single engine aircraft such as Cessna Skyhawk is 164,250 $, a much higher price then the proposed PVA that costs 125,000 $ and is able to transport the same number of people. Approximately 5,550 airports exist in United States and these airports can receive both commercial and noncommercial planes. (24) An example of a typical small airport is Teterboro Airport which provides services

such as cargo transportation, public services, and charter/aircraft services. All of these airports are equipeed with runways, taxiways, and control towers. (25) In terms of energy, most of the aircraft uses gosahol with octane reading of 75, however new inventions make it possible for the airplanes to use diesel efficiently.(26) Such is the case with the newly developed Diamond Star which uses Centurion 1.7 diesel engine.
Air Vehicles can use other sources of energy such as laser (37). An interesting implication is to create high energy laser highways that will provide energy for PAVs. Many helicopters, used extensivly for business porpuses, use gas turbine engines. AS350 helicopter is one of the most efficient helicopters used widely for corporate and tourism purposes in New York.The helicopter is able to carry 6-7 people and is extremely efficient at 258 km/h. (27) Helicopters are extensivly used for police services as LAPD, Coast Guard, to suppress fires, to assist in retrieval of people from innaccessible regions such as mountains, and even to act as ambulances. An average airplane produces large amount of water vapor, carbon dioxide, and nitrates. Water vapor is the main greenhouse effect gas contributor, since water is released in areas were it is relatively dry, thus producing infra-red radiation on Earth.(28) An average airplane produces from 95 to 105 decibels of noise, which is 5 decibels higher then the noise produced by car traffic.(29) Overall airplanes and helicopters are fast and easily accessible. In terms of efficiency, according to NYSERDA, Jet kerosene prices in New York vary from 132.3 cents per gallon to 237.8 cents per gallon.(30)

The new PAVs must be efficient, moderetely cheap, environmentally friendly, and relatively quiet. However the only way to use PAVs is to completely transform the environment in which we live in. Thus Moreover if the PAVs are to replace cars, all PAVs must be able to land in almost any home. Ability to land for door to door use are met by Mid-term Gridlock Commuter (MGC) Aircraft. However users of MGC must live in air-parks that contain their own flight roads. An example of similar idea of a Long Island Airpark. (32) Since the average number of people per vehicle in U.S.A is 1.3 people, the ability of MGC to transport only 2 people from home to work and vice versa.(31) Also since an average American travels 20 miles/day and efficiency of MGC is 40 miles/gallon, only ½ of a gallon will be used daily, making the price of a trip cost 1$.(14) The price for MGC is affordable to an average family in United States, since the price of the most popular car, Honda Accord, in U.S.A is 25,000 $ with auto-transmission. (33) Moreover the ability of MGC to fly will greatly fuel flow of customers eager to try the new product. An example of an innovation such as MGC, that captured majority of Americans, is cell phone services. Cell phones had been unknown to public 50 years ago, whereas today nearly 60 million people use cell-phone services. (34) I propose that in 50 years nearly all of the civilized population on planet Earth will rely on PAVs such as MGC. The first trial

introduction of MGC should be done in cities such as New York and Chicago, since these are the cities were innovations such as cell phones became an overall success. The purpose of MGCs would be to transport people to their jobs in a shortest amount of time possible. MGCs would need separate runways such as in Long Island Park in order to successfully and safely transport people to their destinations. Many companies, shopping malls, schools, and other locations would need runways installed in order to accommodate the new PAVs. Another theory is to create separate runways for assigned sectors of the city. This would allow pilots of MGCs to land at these runways and further continue to their destination. Moreover shopping malls would need such runways to receive the flow of MGC traffic. MGCs would become the new symbol of the 21 century and the product will capture the market instantaneously. Furthermore the use of MGCs would create a boom in U.S.A economy, because the many hours spent in traffic today will be offset, thus giving opportunity for the American workforce to spent more time at their institutions. Businesses would flourish with introduction of MGCs. With the introduction of MGCs, the seller can successfully bring market products to customers, at the most desired time. Many companies in Manhattan would need to design portals in the building infrastructure in order to provide storage for these MGCs. Air Traffic will become a new growing problem for the cities, thus separate air highway levels would be created. Moreover new traffic lights would be designed to include dimensional directions such. An example of such dimensional direction is blue light which would indicate that the vehicle can change air street level. Other changes in society would include production of new services such as maintainance companies and energy provider companies. Finally MGCs would create new jobs and thus further improve U.S.A economy. Moreover new companies will need to manage PAV air traffic, thus in future companies such as IBM can provide IT Services in NYC to assist PAV traffic.(36)

Although introduction of PAVs such as MGC would boost U.S.A economy, new problems will arise from the use of these new air vehicles. The main and most feared issue is safety. Thus people might simply fear to fly PAVs because they are afraid of heights. Another issue of safety with the use of these PAVs is the inevitability of crashes. Thus today car crashes claim more then 500,000 deaths and are responsible for 15 million people injured. (35) However in the case of the PAVs a slight injury or malfunction in the vehicle will surely cause death. Thus if today cars claim 15 million people injured, in future PAVs may claim 15 million deaths. Society also needs to adjust to the noise and pollution created by the new PAVs. Although Mid-term Gridlock Commuter Aircraft makes noise of a motorcycle, which is 80 decibels, the noise is enough to cause permanent ear damage to humans. (19)

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